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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,159	12/06/2006	Veronique Sousa	290297US2PCT	3058

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EXAMINER	
ROLAND, CHRISTOPHER M	

ART UNIT	PAPER NUMBER
2893	

NOTIFICATION DATE	DELIVERY MODE
07/11/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/577,159	Applicant(s) SOUSA ET AL.	
	Examiner Christopher M. Roland	Art Unit 2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 May 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 41-59 is/are pending in the application.
- 4a) Of the above claim(s) 46,47,49 and 53-57 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 41-45,48,50-52,58 and 59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 10 May 2011 has been entered.

Status of the Claims

2. Amendment filed 8 April 2011 is acknowledged. **Claims 20-27 and 29-40** have been cancelled. **Claims 41-59** have been added. **Claims 41-59** are pending.

Election/Restrictions

3. **Claims 46, 47, 49, and 53-57** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected method and species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8 January 2008.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 41-44, 48, 50-52, 58, and 59** are rejected under 35 U.S.C. 102(b) as being anticipated by Holmberg (US Patent 4,177,475, hereinafter Holmberg '475) of record.

With respect to claim 41, Holmberg '475 teaches (FIG. 3) a phase-change memory cell as claimed, comprising:

between two electrical contacts (23 and 24), a portion in a memory material with an amorphous-crystalline phase-change and vice versa, as a stack (28-30) with an active central area (29) located between two passive outmost areas (28 and 30) (col. 5, ln. 7-58); and

an interface between the active central area and each passive outmost area, each passive outmost area being made in a material having a melting temperature higher than that of the material of the active central area, the material of the passive outmost areas having very low solubility or zero solubility in the material of the active central area, the material of the passive outmost areas being a chalcogenide having the same chemical nature with a different composition of those of the material of the active area, the interface being inert or quasi-inert from a physico-chemical point of view even during a writing operation of the phase-change memory cell (col. 5, ln. 7-58).

With respect to claim 42, Holmberg '475 teaches wherein each passive outmost area is made in a material having a thermal conductivity less than or equal to that of the material of the electrical contact which is closest to it (col. 5, ln. 7-58).

With respect to claim 43, Holmberg '475 teaches wherein the passive outmost areas have, in a crystalline phase, an electrical resistance less than or equal to that of the active central area in a crystalline phase (col. 5, ln. 7-58).

With respect to claim 44, Holmberg '475 teaches wherein each passive outmost area is made in a material promoting a phenomenon of formation of crystalline germs in the active central area in proximity to the interface (col. 5, ln. 7-58).

With respect to claim 48, Holmberg '475 teaches further comprising an electrically insulating material (27), wherein the active central area is at least partially confined laterally by the electrically insulating material (col. 5, ln. 7-58).

With respect to claim 50, Holmberg '475 teaches wherein at least one of the passive outmost areas and the active central area coincide laterally (col. 5, ln. 7-58).

With respect to claim 51, Holmberg '475 teaches further comprising an electrically insulating material (27), wherein at least one of the passive outmost areas is bordered with the electrically insulating material (col. 5, ln. 7-58).

With respect to claim 52, Holmberg '475 teaches a memory including a plurality of memory cells according to claim 41 as claimed (col. 5, ln. 7-58).

With respect to claim 58, Holmberg '475 teaches wherein each passive outmost area is made in a material having a thermal conductivity less than or equal to that of the material of the active central area (col. 5, ln. 7-58).

With respect to claim 59, Holmberg '475 teaches wherein
each interface is directly between the active central area and one of the two
passive outmost areas (col. 5, ln. 7-58); and

the material of the active central area has undergone a phase change (col. 5, ln. 7-58).

5. **Claim 45** is rejected under 35 U.S.C. 103(a) as being unpatentable over Holmberg '475 as applied to claim 24 above, and further in view of Tanaka et al. (US Patent Application Publication 2004/0051161, hereinafter Tanaka '161) and Pertov et al. (US Patent 4,314,256, hereinafter Pertov '256), both of record.

With respect to claim 45, Holmberg '475 teaches the device as described in claim 44 with the exception of the additional limitation wherein the material of the active central area includes between about 16% and 30% of tellurium and between about 84% and 70% of antimony, the material of each passive outmost area being antimony or antimony mixed with tellurium with a percentage ranging up to about 2%, these percentages being atomic percentages.

However, Tanaka '161 teaches a chalcogenide material (12) comprising between about 16% and 30% of tellurium and between about 84% and 70% of antimony ([0046])

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as a recording layer in a non-volatile memory that can increase the possible number of data rewriting cycles while lowering power consumption ([0008]).

Further, Pertov '256 teaches a chalcogenide memory material having an art-recognized inert separation layer of, for example, antimony thereon to prevent the interaction of other layers with said chalcogenide memory material (col. 2, ln. 60 – col. 3, ln. 17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the active central area of Holmberg '475 comprising between about 16% and 30% of tellurium and between about 84% and 70% of antimony as taught by Tanaka '161 as a recording layer in a non-volatile memory that can increase the possible number of data rewriting cycles while lowering power consumption; and to have formed the passive outmost areas of Holmberg '475 comprising antimony or antimony mixed with tellurium with a percentage ranging up to about 2% as taught by Pertov '256 as an art-recognized inert interface material to prevent the interaction of other layers with said active central area.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. See *In re Leshin* (125 USPQ 416).

Within purview of one having ordinary skill in the art, it would have been obvious to determine the optimum concentrations of tellurium and antimony. See *In re Aller*, *Lacey*, and *Hall* (10 USPQ 233-237), "It is not inventive to discover optimum or workable ranges by routine."

Response to Arguments

6. Applicant's arguments filed 8 April 2011 have been fully considered but they are not persuasive.

Applicant argues (remarks, pp. 9-11) that Holmberg '475 discloses a chalcogenide [*sic*] but with such a chalcogenide [*sic*] the interface is not inert or quasi inert. Applicant alleges that the dotted line of FIG. 4 of Holmberg '475 represents a second state wherein the composition distribution of germanium has changed from the solid line representing a first state. Since the composition has changed, the interface is not inert or quasi inert from a physical-chemical point. Examiner respectfully disagrees.

Holmberg '475 teaches (FIG. 3) the interface being inert or quasi-inert from a physico-chemical point of (col. 5, ln. 7-58). Holmberg '475 discloses, "FIG. 4A represents a graph where the solid line illustrates the germanium concentration in atomic percentage as initially deposited for the structure of FIG. 3 as a function of the distance of the respective layers from the top or positive electrode. The dotted line in FIG. 4A represents the composition distribution that is formed after the device has been operated for many set-reset cycles," (col. 5, ln. 59 – col. 6, ln. 4). The change in Ge concentration amongst the layers of FIG. 3 represented as a difference between the solid line and the dotted line of FIG. 4A is only as a result of many set-reset cycles. Initially, and for much of the device usage, the interface between the active central area and each passive outmost area is at least quasi-inert. This is evidenced by Holmberg '475's further disclosure, "Since these layers have very small thicknesses, the device

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will operate in a low voltage mode where diffusion effects into these nonswitching regions are minimized," (col. 5, ln. 50-53). Since diffusion amongst the layers is minimized, the interface between the active central area and each passive outmost area qualifies as quasi-inert.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Roland whose telephone number is (571)270-1271. The examiner can normally be reached on Monday-Friday, 10:00AM-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571)272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. M. R./
Examiner, Art Unit 2893

/Tom Thomas/
Supervisory Patent Examiner, Art
Unit 2893